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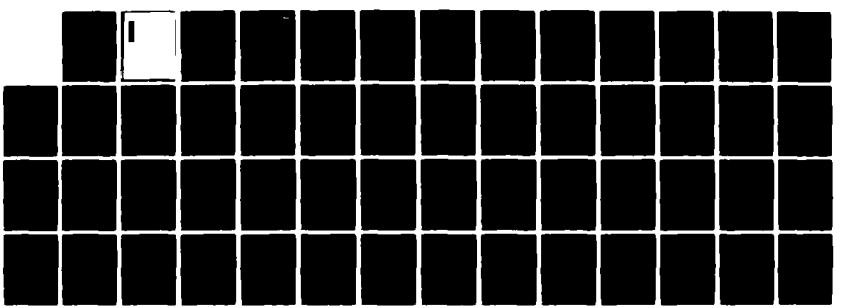

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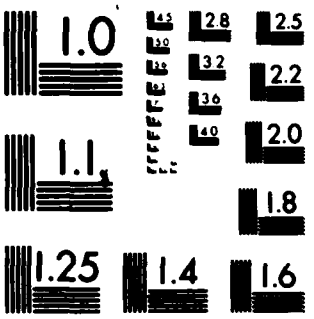

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February 1984

COMPUTERIZED VOCATIONAL GUIDANCE (CVG) SYSTEMS: EVALUATION FOR USE IN MILITARY RECRUITING

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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: NPRDC TR 84-21	2. GOVT ACCESSION NO.: AD-A139 527
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): COMPUTERIZED VOCATIONAL GUIDANCE (CVG) SYSTEMS: EVALUATION FOR USE IN MILITARY RECRUITING	5. TYPE OF REPORT & PERIOD COVERED: Interim Report 1 Oct 1982-31 May 1983
	6. PERFORMING ORG. REPORT NUMBER: 62-83-17
7. AUTHOR(s): Herbert George Baker	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Navy Personnel Research and Development Center San Diego, California 92152	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: MIPR-13ARI-8311
11. CONTROLLING OFFICE NAME AND ADDRESS: Navy Personnel Research and Development Center San Diego, California 92152	12. REPORT DATE: February 1984
	13. NUMBER OF PAGES: 53
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Vocational guidance
Computerized vocational guidance
Computerized counseling
Army recruiting
JOIN system
Military recruiting
Computerized accessioning system

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Five civilian and three military computerized vocational guidance (CVG) systems were considered and evaluated for their contributions to the design and development of a CVG system for use in military recruiting. It was recommended that a system specifically designed for the recruiting environment be developed.

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FOREWORD

This research was conducted in support of the Army Joint Optical Information Network (JOIN) system, in accordance with a letter of agreement between the Navy Personnel Research and Development Center and the Army Research Institute for the Behavioral and Social Sciences (ARI). The purpose of this research is to design, develop, test, and evaluate a computerized vocational guidance (CVG) system to be incorporated in the JOIN system and to develop computerized adaptive screening, assignment prediction, and management support capabilities. The research reported herein is expected to benefit the Army Recruiting Command, ARI, and the research community.

J. W. RENARD
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SUMMARY

Problem

Armed forces recruiting faces serious challenges in the future due to a declining pool of 17- to 21-year-old males and the attendant increased competition from civilian employers and educational institutions. If the military services are to attract and enlist a sufficient number of quality applicants to meet recruiting objectives and maintain readiness under the all-volunteer force (AVF), they must improve the accessioning process. The Army Recruiting Command has launched a major, innovative effort to streamline and improve its recruiting and accessioning methods. In the forefront of this effort is the Joint Optical Information Network (JOIN) system. Army enlisted applicants will directly interact with this advanced accessioning system in the course of the recruiting and accessioning processes.

The Navy Personnel Research and Development Center (NAVPERSRANDCEN), through an agreement with the Army Research Institute for the Behavioral and Social Sciences (ARI), is developing a computerized vocational guidance (CVG) system for incorporation into the JOIN System.

Objective

The objective of this effort was to evaluate the suitability of previously developed CVG systems for adoption or adaptation for military recruiting purposes.

Approach

The Educational Resources Information Center (ERIC) and the Psychological Abstracts (Psych Abstracts) on-line systems were used to search pertinent literature. The specific intent was to highlight those systems that have potential for contributions to the JOIN system.

Results

The progress towards interactive, stand-alone, CVG systems was traced as an outgrowth of the combination of computer-assisted instruction systems and computer programming that includes a monitoring function. Five civilian and three military computerized systems were reviewed and evaluated for their adaptability for use in recruiting or the relevance of any of their features for the design and development of a CVG system.

Conclusions

Although there are several well-conceived and developed systems currently in use, only one system, which was designed by the Navy, has been designed specifically for the military recruiting environment. This environment will not accommodate the time-extensive guidance processes incorporated in the extant civilian systems. Further, none of the systems has devoted any conceptual or developmental effort to dealing with a military-based occupational classification system or to considering the uniqueness or exigencies of military service. Finally, seven of the eight systems reviewed would involve licensing/royalty expenses, while one would involve extensive programming for automating significant portions of its off-line materials. Therefore, no extant CVG system appears suitable for incorporation (even with modifications) into the Army JOIN System.

Recommendation

It is recommended that research and development be initiated on a CVG system oriented specifically for use in military recruiting, based on (1) a synthesis of vocational guidance theory, (2) the unique aspects of military service, (3) the characteristics of military applicants, (4) the constraints of the recruiting environment, and (5) the operational requirements of the Army.

CONTENTS

INTRODUCTION

Problem

Armed forces recruiting faces serious challenges in the years ahead due to a declining pool of 17- to 21-year-old males and the attendant increased competition from civilian employers and educational institutions. If the military services are to attract and enlist a sufficient number of quality applicants to maintain readiness under the all-volunteer force (AVF), they must improve the accessioning process. The Army Recruiting Command has launched a major, innovative effort to streamline and improve its recruiting and accessioning methods. The Joint Optical Information Network (JOIN), an advanced, computer-based personnel accessioning system, is in the forefront of this effort.

The Navy Personnel Research and Development Center (NAVPERSRANDCEN), through an agreement with the Army Research Institute for the Behavioral and Social Sciences (ARI), is developing a computerized vocational guidance (CVG) system for incorporation into the JOIN System.

Objective

The objective of this effort was to review and evaluate previously developed CVG systems in both the civilian and military communities to determine whether they are suitable for adoption or adaptation for military recruiting.

APPROACH

CVG, as used herein, means an integral, self-contained guidance system that does not depend on external input. Strictly speaking, no such system exists. The literature is replete with references to computer-assisted guidance, meaning information-retrieval systems used in conjunction with counseling. There are also many references to CVG systems; however, all such systems are explicitly designed to assist a human counselor.

Computer storage and efficient retrieval of vast amounts of data are not new and have been adequately reported on in the recent literature (Bailey, 1970; Cairo, 1977; Douglas, 1977; Friesen, 1970; Harris, 1968, 1973; Miller, 1970; Morgan Management Systems, Inc., 1978; Super, 1970; Weinstein, 1969). However, the increasing degree of sophistication that attends search strategies and retrieval methodology does not lead to CVG. Rather, it only increases the facility of a library system. CVG, on the other hand, includes all of the data storage and retrieval capabilities, plus the ability to (1) engage the user interactively in learning about careers, career decisions, and career decision-making methods, and (2) guide the user in making tentative and/or firm choices, all without requiring human intervention. Therefore, it was determined that the systems selected for review and evaluation would:

1. Require no off-line activities (they may accept but not require off-line activities).

2. Require no counselor intervention (they may accept or provide for it but not require it).

3. Include didactic materials to teach career decision-making and include choice-making activities.

Exceptions would be made to the above criteria if a system had made otherwise significant contributions to CVG that should be considered in designing this capability for the JOIN system.

RESULTS

Literature Search

The literature search showed that CVG has not been the subject of wide research. The existing research on CVG is due primarily to civilian developers of guidance systems. The military research community has yet to field a single system.

This dearth of CVG research is not due to a lack of technology. The elements needed to comprise a CVG system, at least as a research vehicle, have been in various stages of preparation for many years. Initial efforts at combining sound theory and automated data processing (ADP) equipment were undertaken over 15 years ago, as was simulation of a counselor's interview behavior. Computerized counseling has even entered the domain of personal dilemma resolution (Wagman, 1980; Wagman & Kerber, 1980).

Antecedents of CVG

CVG is a composite. Its simplest component, which is usually considered as being synonymous with it, is only a rather unsophisticated employment of the computer's information-processing capabilities. Because computers offered unique opportunities to store and retrieve vast amounts of data, and to do so with alacrity, consistency, and thoroughness (Oliver, 1977), researchers and counselors soon realized that they could be used for information organization, mastery, storage and dispensing (Minor, 1970; Rayman & Harris-Bowlsbey, 1977). (See Ventura County Superintendent of Schools Office, 1979 for a study of career information systems and user needs.) Computer-assisted guidance became practical and cost effective in the 1960s (Ryan & Drummond, 1981). Counselees could be given direct access to information and the information could be individualized (Borow, 1973). Although this greatly benefitted those who used great quantities of occupational information, it was computerization of one function--not CVG.

ADP capabilities were also used in connection with the testing features of counseling, thus avoiding intrusive delays in administration, scoring, and actual interpretation of test results. However, this use is also automation of a limited functional area of vocational guidance--not CVG.

The advent of computer-assisted instruction (CAI) (see Impellitteri, 1967, for a discussion of CAI, and Hickey & Newton, 1967, for a review of CAI literature) made CVG a possibility. What sets off CVG from computer-assisted counseling is the fullness and integrity of a self-contained counseling system, transcendent of simple information storage (however great), information retrieval (regardless of the speed or efficiency of search strategies), and assessment methods (no matter how extensive). It is the replacement of that substantive element of counseling wherein the counselee learns about careers, the importance of work, self, ways to explore both self and occupations, and how to relate the two, and how to explore, project, and choose. Whether Rogerian or more directive in nature, the essential counseling ingredient is to relate the aware individual to the world of work in the most meaningful way. Thus, CAI offered the bridge between computer-assisted and computerized guidance.

Inquiry Mode and Monitoring

The earliest efforts at guidance automation involved what became known as indirect inquiry systems. In these systems, tests, questionnaires, requests, etc. are forwarded to a computer center for batch processing, and the results subsequently returned to the counselor or counselee. The obvious disadvantage is turn-around time; that is, the delay in results and the temporal separation of system and user. An example of an indirect system is the Educational and Career Human Resources Information System (ECHRIS) (Borow, 1973).

In direct inquiry systems, the person and the computer interact, on-line, in real time. What is requested is received, essentially at once. What is entered is acted upon, without any appreciable delay. Users have much more control over the program and are aware of the effects of their choices (Oliver, 1977). The advent of direct inquiry placed user and machine in interaction at the same time (and pragmatically at the same location).

Even more significant than the advent of direct inquiry was the genesis of monitoring; that is, the ability to track or keep track of. It is the process by which the computer analyzes and interprets user responses (Borow, 1973; Harris, 1974). As Harris (1972) noted, a direct inquiry system without system monitoring is simply a well-organized, fast, conversational, automated library. The Guidance Information System (GIS) (Douglas, 1977) is an example (Oliver, 1977).

There are two kinds of monitoring: system and personal. In system monitoring, the computer keeps a record of the user, the individual's data, use of the system, decisions, etc. Obviously, this becomes convenient for personalizing cathode ray tube (CRT) displays, printouts, etc. More importantly, it permits interaction as an ongoing process from sign-on to sign-off, and even into later return sessions. Of course, system monitoring was always possible and was sometimes used with indirect inquiry, but its effects are less significant when long-distance and time-separated. It is system monitoring that enables interactive dialogue and the emerging semblance of a true conversational mode (or "counseling") to take place. The Computerized Vocational Information System (CVIS) and the Educational and Career Exploration System (ECES) are examples of direct inquiry systems with system monitoring (Borow, 1973).

The future belongs to personal monitoring, which will allow the individual counselee to guide the guidance process to the greatest degree (Oliver, 1977; Rayman & Harris-Bowlsbey, 1977). Above and beyond menu-driven, user-friendly software, personal monitoring (to the extent it becomes technologically possible and economically feasible) will enable genuinely interactive guidance, freeing the user to wander and explore and go beyond programmed choices (i.e., guidance that is conversational and "humanized" to the greatest degree).

Development of a CVG System

It is not surprising that there is, as yet, no system with the capability just described, although ECES and the System of Interactive Guidance and Information (SIGI) partially achieve it (Borow, 1973). The Information System for Vocational Decisions (ISVD) (Tiedeman, 1979) was a significant attempt to approximate a CVG system in the 1960s but its development was terminated due to funding problems (Oliver, 1977). Rayman and Harris-Bowlsbey (1977) suggested a generational trichotomy--first, second, and third generations. Jacobson and Grabowski (1982) use a similar tripartite division--batch-processing systems, on-line career information systems, and on-line career guidance systems. Batch processing systems represent the first generation.

Many computer-assisted guidance systems have been developed. Some are remarkably broad in approach, firm in theoretical foundation, and thorough in occupational search and self-exploration. Many have undergone rigorous research and development, test, evaluation, and marketing to become widely-used systems. Of these, the so-called second generation systems--CVIS, ECES, GIS, the Career Information System (CIS), and the Coordinated Occupational Information Network (COIN)--are representative (Rayman, Bryson, & Bowlsbey, 1978), and are each the basis for several offshoots (see Minor, 1970 & Shatkin, 1980 for reviews of these systems). Computer-assisted guidance (CAG) systems have become increasingly prevalent since the 1960s (see Katz & Shatkin, 1980 for a conceptual analysis of CAG purposes and applications). A military effort along these lines resulted in a prototype Navy Vocational Information System (NVIS) (Yellen & Foley, 1978).

Third-generation systems are those that begin the approach to personal monitoring and include significant teaching and guidance functions in addition to self-assessment and occupational information provision (e.g., teaching decision-making skills and assisting users to clarify values). In brief, they are systems that can stand alone if need be and are very few in number, limited perhaps to DISCOVER (Raymon, Bryson, & Bowlsbey, 1978) and SIGI (Katz, 1974) and their descendants (Jacobson & Grabowski, 1982). Most computerized systems fail to fully exploit their potential (Chapman & Katz, 1982). Both DISCOVER and SIGI are reviewed in the appendix.

Reasons and Directions

The above explanation points to the real reason why no CVG systems have been developed. Systems in use have been developed with the purpose (ostensibly, at least) of assisting counselors (Borow, 1973; Chapman & Katz, 1982; Harris, 1974; Jacobson & Grabowski, 1982; Katz & Shatkin, 1980; Rayman & Harris-Bowlsbey, 1977; Ryan & Drummond, 1981; Super, 1973).

When a qualified counselor is present and at work, second-generation systems are fully adequate. However, sometimes counselors are not available, professionals are not on hand to guide, vocational guidance is absent, personnel turbulence in counselor ranks makes even the good ones potentially unavailable, and the geographic dispersion of counseling sites is coupled with mass numbers of individuals needing guidance towards appropriate occupational decisions--a condition not limited to armed services recruiting (Arbeiter, 1981). This is the time when CVG is needed and that is the raison d'etre for this research and development work.

Review and Evaluation of Specific CVG Systems

The following eight systems were selected for review and evaluation:

1. Automated Counseling Simulation System (AUTOCOUN).
2. Computerized Heuristic Occupational Information and Career Exploration System (CHOICES).
3. DISCOVER.
4. Information System for Vocational Decisions (ISVD).
5. System of Interactive Guidance and Information (SIGI).
6. Automated Guidance for Enlisted Navy Applicants (AGENA).
7. Army Education Information System (AREIS).
8. Officer Career Information and Planning System (OCIPS).

The first five systems listed are civilian; and the remaining three, military. They are described in the appendix in terms of their (1) general development information and computer equipment, (2) number, nomenclature, and functioning of subsystems (or modules), (3) capability of user movement between subsystems, (4) nomenclature and contents of data bases, (5) results of any evaluations, trials, field tests, etc., (6) significant (recent) developments with the system or its marketing, (7) extent of present use of the system, (8) implications for use in military recruiting, and (9) reference materials used in the review.

CONCLUSIONS

Although there are several well-conceived and developed systems currently in use, only the AGENA System has been designed specifically for the military recruiting environment. This environment will not accommodate the time-extensive guidance processes of CHOICES, DISCOVER, or SIGI. Of more significance, none of the systems has devoted any conceptual or developmental effort to dealing with a military-based occupational classification system, or to the uniqueness and the exigencies of military service. Finally, all of the operational systems except CHOICES would involve licensing/royalty expenses. CHOICES has a prohibitive length and would also involve extensive programming for automation of its travel guide. In conclusion, no extant CVG system appears suitable for incorporation (even with modifications) into the Army JOIN System.

RECOMMENDATION

It is recommended that research and development be initiated on a CVG system oriented specifically for use in military recruiting, based on (1) a synthesis of vocational guidance theory, (2) the unique aspects of military service, (3) the characteristics of military applicants, (4) the constraints of recruiting, and (5) the operational requirements of the Army.

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APPENDIX

REVIEW OF COMPUTERIZED VOCATIONAL GUIDANCE SYSTEMS

REVIEW OF COMPUTERIZED VOCATIONAL GUIDANCE SYSTEMS

I. CIVILIAN SYSTEMS

A. Automated Counseling Simulation System (AUTOCOUN)

1. Description. AUTOCOUN is not a CVG system but, rather, an automated educational counseling system. Begun in 1959, it was an early attempt at using a computer to simulate the educational counseling behavior of an expert counselor. AUTOCON, which was developed jointly by the Systems Development Corporation, the Palo Alto Unified School District, and the University of Oregon, differed from any previous work, and has yet to be duplicated. The effort grew out of an attempt to apply systems analysis to school guidance methods; that is, a simulation was performed to determine (a) which counselor behaviors could be automated, (b) counselee attitudes toward an automated counseling system, (c) the effectiveness of a method of analyzing counseling behavior, and (d) future directions for exploring computer use in counseling and related areas.

After the developers had surveyed many expert counselors, they decided to simulate one expert counselor's course-planning interview for ninth grade students. The counselor recorded his thoughts during a pre-interview perusal of a student's records and during a subsequent educational planning interview with that student. These thoughts were flowcharted and synthesized and the rules for decisions or recommendations by the counselor were extrapolated. From an analysis of pre-interview and interview recordings for 25 students, two programs were developed: (a) a pre-interview program to simulate pupil appraisal and other counselor preparatory work, and (b) an interview program simulating an actual interview, eliciting counselee decisions regarding high school courses to include in his/her schedule. Outcomes of the counseling session were (a) prediction of a student's performance in high school and college courses, (b) a list of specific courses chosen for 10th grade, and (c) a tentative list for 11th and 12th grades. Accompanying these was a counselor printout identifying students needing additional help (together with some of the reasons). The computer system used was an IBM Q-32 with a TWX Model 31 teletype. The student was seated at the terminal and instructed to type in his or her student number and press the return key.

2. Subsystems. AUTOCOUN had no subsystems as such. After an 8-minute orientation sequence, the counseling sequence began. The total interview lasted 8-30 minutes, depending on the complexity and specificity of a student's planning, the appropriateness of that student's choices, and the speed of system-user interaction. The computer programming included sets of instructions for data analysis and synthesis and for deciding what statement to display, plus a repertoire of statements. Computer queries and student responses regarding course grades for the previous semester, problems with courses, plans for post-high school education, probable majors, etc., comprised the interview. The computer calculated a student's grade-point average (GPA), looked up high school scholastic aptitude scores, and determined expected outcomes from prediction tables. From these expectancies, AUTOCOUN calculated the goodness of pupil choices and responded accordingly. Ultimately, a list of courses was constructed for the following school year, and a preliminary selection of courses was made for the 11th and 12th grades.

3. Movement Between Systems. The sequence of interaction was fixed (there were no discrete subsystems for user progression).

4. Data Bases. AUTOCOUN included:

a. Pupil appraisal data (e.g., grades, test scores).

b. Prediction (experience) tables for Palo Alto schools (indicating the number of chances in 10 that students with a certain GPA in 9th grade and a known scholastic aptitude measure would receive either an A, B, C+, C, or below C in high school courses, and the number of chances in 10 that a student with a projected A, B, C+, C, or below C average would be accepted at various kinds of colleges (ivy league, "other" colleges and universities, California state colleges, junior colleges, and technical schools).

c. Course offerings at Cubberly High School (a local school).

5. Results of Evaluations. AUTOCOUN was tested at Palo Alto in March 1965. Although the computer-simulated counselor agreed with the human counselor in about 75 percent of the appraisal statements, it did predict higher GPAs and more potential dropouts. In addition, it encouraged more exploration of broader academic fields than did the human counselor. The decisions made by students interacting with AUTOCOUN concerning courses in the 10th, 11th, and 12th grades differed somewhat from their counselor-assisted decisions, but the differences were minor in both number and content. Interestingly, more students indicated having problems with school courses when interacting with AUTOCOUN than when interacting with the counselor.

6. Significant Developments. None.

7. Present Use. AUTOCOUN is not presently operational or under further development.

8. Implications for Use in Military Recruiting. AUTOCOUN as an educational counseling system has little relevance to vocational counseling or recruiting. Of great significance, however, is the fact that a counselor's behavior was effectively simulated in so early an attempt. (Though not reviewed here, since it is for greatly differing applications, the PLATO computer-based dilemma counseling system (PLATO DCS) demonstrates later work in automated counseling (see Wagman, 1980; Wagman & Kerber, 1980).)

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B. Computerized Heuristic Occupational Information and Career Exploration System (CHOICES)

1. Description. CHOICES, one of the newer interactive, computerized career exploration systems, was developed by the Canada Employment and Immigration Commission (CEIC). CHOICES is not a CVG system. It is dependent on off-line activity for significant aspects of a counseling strategy that integrates the counselor, counselee (user), and computer in three phases. In phase 1, the user completes off-line exercises of self-exploration and clarifies career needs and expectations. In phase 2, the user interacts with the computer. In phase 3, the user considers possible follow-up actions (in conjunction with the counselor).

CHOICES was developed on a Burroughs 6700 computer. Interaction is through teletype terminals (with a print line of 120 characters) connected to the computer by telephone using an acoustic coupler. CRTs are not used. Approximately 350 terminals can simultaneously access the system and perform on-line searches. The user-computer interaction averages 40-45 minutes, with repeat sessions three or four times a year. A 1-½ minute "terse mode" can be used by counselors, replacing the "conversational mode" used by counselees. A counselor summary print-out is provided.

CHOICES offers easy retrieval of information written at the 9th grade level and print-outs in either English or French. Most commands consist of code numbers or Y (for Yes) or N (for No) responses selected from menu. Users specify (a) the language to be used, and (b) the province to which the information should apply. These specifications may be changed during the interactive session. CHOICES permits both direct access and structured search. There is no established progression through modules or subsystems as such. The subsystems involve multiple search methods.

Initially, the user reads a user guide describing the system and completes a worksheet or "travel guide." The travel guide responses, which become the parameters for computerized information retrieval, consist of 15 topics that are used in any combination to relate person to job. The occupational parameters and search strategies can be discussed with the counselor before using the computer, but users design their own career exploration route to meet their own needs and values with the help of a structured set of guidelines.

The user types in a code number to get information from the occupations or institutions files and the computer begins to explore along one of many alternate routes (e.g., one of 13 routes in the occupations file--occupational titles, occupational fields, occupational interests, occupational aptitudes, temperament factors, physical demands, indoor/outdoor considerations, physical activities, conditions of working environment, hours of work, travel, etc., worker supply/demand projections, earnings, and education requirements). Using the first route in the occupations file, the computer can give specifics on a single occupation, compare up to three occupations, or provide lists of occupational specialization areas. The other 12 routes use a menu (multiple-choice) format of exploration.

2. Subsystems. CHOICES has four subsystems, EXPLORE, RELATED, SPECIFIC, and COMPARE, which are described below.

a. EXPLORE. The user selects from 12 categories of job characteristics or topics, specifying the order in which they are to be considered by the computer. Two of these categories (Interests and Aptitudes) will accept the results of either the Canadian

Occupational Interest Inventory or the General Aptitude Test Battery (taken off-line), or else the user can conduct self-assessment on the basis of questions asked off-line in the "travel guide" or on-line by a short quiz. The user can determine his or her self-awareness, capabilities, and limitations by completing both a test and a self-assessment instrument and entering the results. The computer will respond with a graphic comparison of self-estimated and tested aptitude profiles.

Categories allow the user to select different numbers of specifications, from one to many. Some will accept a "no preference" response. Occupational specifications can include desired features in some categories, features to be avoided in others, and both in others. The computer responds to each specification as it is entered. The printout shows the total number of occupations accessible, the number remaining after the previous specification was entered, and the number now remaining. The computer will automatically print out the occupations remaining when their number is less than 25. If queried, the computer will briefly explain which specifications ruled out an occupation.

b. RELATED. The user types an occupation code and then the codes for as many as three categories of characteristics. The computer tells how many occupations are related to the occupation of interest on the basis of the specified characteristics. The user can request a list of these occupations or choose to add another category of characteristics.

c. SPECIFIC. The user is offered the choice of 14 topics of information about any occupation, plus "all of these topics."

d. COMPARE. The user may compare either two or three occupations at a time on any of the 14 topics (job characteristics). The user types the codes for the occupations and specifies the topics. A one-sentence description of each occupation, plus the requested topics, are printed.

Once the user has made some general explorations into desired areas of work, he or she can access the Institutions File to get specific information on educational and training schools by entering specific criteria relevant to program content, eligibility, location, class size, etc.

3. Movement Between Subsystems. Movement between the two information files is simple. Users can transfer readily from one to the other. For example, if CHOICES suggests the occupation "accountant," it will also suggest suitable training programs and where they are offered.

4. Data Bases

a. The occupational information file contains information on over 1,100 primary occupations and over 3,000 similar or related occupations, representing over 89 percent of Canada's active labor force. Occupations are categorized by the 7-digit Canadian Classification and Dictionary of Occupations (CCDO) code number and titles--major groups (i.e., 22 broad fields of work--occupational fields), minor groups (a collection of slightly more closely related occupations within major groups), and unit groups (uniquely coded individual occupations).

b. The institutions file contains information on approximately 800 post-secondary institutions in two major formats: (1) institution-specific topics (category of institution and location, categories of students admitted, city size, library facilities,

student enrollment statistics, faculty size, housing availability and costs, student financial aid, and contacts for further information), and program-specific topics (all programs offered including regular, part-time, cooperative, apprenticeship, graduate, and continuing education program; language of instruction; number of applicants per year; number accepted; number completing the program or first academic year; qualifications awarded; session start dates; application deadlines; tuition and compulsory fees; admissions requirements; durations; start dates; retention rates; financial aid available to students, etc.).

c. A current job vacancy file is undergoing testing. This file would include information on job openings, by province, and would relate to the occupational information file.

5. Results of Evaluations. An early version of CHOICES was tested at a high school in Ottawa in May 1977. The general reaction was positive, with the number of students requesting to use the terminal exceeding the number forecasted. Ninety-four percent of student-users indicated they liked CHOICES because it was fun, easy to use, educational, and, more importantly, nonthreatening, accepting any response they made. Eighty-four percent said CHOICES broadened their career plans; and about the same percentage, that they were more sure about the type of work they wanted. More than 90 percent felt that others their age should have an opportunity to use CHOICES. Over 66 percent said they would now be able to talk to their parents more effectively about their career plans after taking home their CHOICES printout. Counselors appreciated CHOICES as a tool in career counseling, and enjoyed the added credibility CHOICES brought to their position. Parents who discussed the CHOICES print-outs with their children were very favorably impressed.

CHOICES was tested in October 1977 at 15 sites throughout Alberta and British Columbia. Four months of testing at high schools, manpower centers, the University of Alberta, and the Vancouver Community College provided evidence that an extended network was feasible. An initial problem occurred with loss of the record of a conversation when a line fault or equipment failure interrupted that conversation. The user would then have to repeat all the conversation up to that point. Software modifications provided for retention in memory of the complete conversation up to the time of a fault. Upon system restoration, the user can resume the conversation.

Modifications on routine instructions and scripting sequences were made before testing was resumed in New Brunswick and Ontario in March 1978 at several schools and Canada Manpower Centers. Results were similar to those of previous tests: CHOICES users reported their experiences as worthwhile, effective in providing occupational and career information, and important in effects on their career exploration, planning, and decision-making processes. They recommended its use by all senior high school students involved in career planning and exploration.

6. Significant Developments. The Canadian Forces Personnel Applied Research Unit proposed a counseling system for the Canadian armed forces based on a "rescripted" CHOICES, or CHOICES (military) (Wilson, 1979, 1980a,b). The project was pursued through the detailed design stage. No further efforts have been reported in the literature.

7. Present Use. CHOICES is a rapidly expanding system operating in more than 50 Canada Employment Centers. It is also being used in educational institutions and in youth counseling centers. The number of times it is accessed is not available. There is one main base in Ottawa and one in Toronto. More bases will be added as required to support a national network. By 1983, the network was expected to support 3000 to 4000 terminals, using several main bases established across the network.

CEIC plans to make CHOICES available, essentially cost-free, to any interested, non-profit agency. Any necessary conversion of CHOICES software will be the responsibility of such users. CEIC will provide technical consultation, to the extent possible, to agencies considering adoption of the system and will furnish periodic information updates by computer tape exchange.

In the United States, CHOICES is being considered by at least ten states and is currently being adapted by at least two states for use in a variety of settings (fully operational in North Carolina). CHOICES has also been in use in comprehensive employment and training act (CETA) centers.

8. Implications for Use in Military Recruiting. CHOICES has several features that militate against its use in recruiting:

a. It is designed for repeated use.

b. Its occupational and institutional data bases are compiled on Canadian data.

c. Significant portions of the guidance process are required to be done off-line, and a counselor would probably be needed.

d. It does not include automated didactic materials on career exploration, planning, and choice-making.

CHOICES does have significant features that should be considered in the design of any military CVG system:

a. The number of ways by which occupations can be accessed (specifically, the four major access routes: EXPLORE, SPECIFIC, COMPARE, RELATED).

b. The number of personally relevant criteria that are elicited.

c. The absence of any instruments requiring royalty or licensing fee payments.

d. The ability to compare features for three occupations at a time.

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C. DISCOVER

1. Description. DISCOVER, developed by the DISCOVER Foundation during the 1972-1976 timeframe under research sponsored by the Illinois Division of Vocational and Technical Education, the U.S. Office of Education, and IBM Corporation, is a fairly new and highly sophisticated, computer-based career guidance and counselor-administrative support system. There are two versions of the original DISCOVER system (now called

DISCOVER I): an initially developed version designed for use by students in grades 7-12, and a more recent modification extending the system to an adult and college-aged population. The DISCOVER system is maintained and distributed by DISCOVER/ACT of the American College Testing (ACT) Program. DISCOVER provides:

a. A systematic guidance program of 15 to 20 hours' length, for use over several years of the career exploration period, including computer-assisted instruction and simulation exercises in the areas of values clarification, decision-making, and occupational classification.

b. Assistance in assessing career development status for the purpose of suggesting a prescribed route through the system.

c. On-line administration and interpretation of testing instruments.

d. Direct access by counselors to large data bases of educational and vocational information.

e. The capability for counselors to monitor user progress.

DISCOVER is delivered on CRT terminals that can be located at multiple locations, driven by a centrally-located mainframe or minicomputer (IBM 370 or 4300 Series). DISCOVER is also available for use On Apple II (upgraded), Apple IIe (upgraded), IBM personal computers, and Radio Shack computers. Most accessing commands are entered in response to a prompt given by the computer and consist of selecting from options displayed as a menu. Interaction is primarily with a light pen, though some responses are made on keyboard. A user can operate the system without assistance. Everything a user needs to know to operate the system is taught on-line in the entry module (subsystem) the first time the user signs on. This information may be obtained again at any time by simply pressing a "help" key. Data about the user (including name, course, and grades; test information; extracurricular activities; and work experience) are stored in the system for use in comparing occupational or training requirements with the user's past experience.

DISCOVER permits both direct access and structured search. Each list of occupations generated is automatically retained (up to a maximum of 40 occupations). Occupations may be searched for by (a) decisions that might be made after high school (e.g., college vs. noncollege), (b) nine values related to occupations, (c) any two points on the Holland hexagonal classification system (Holland, 1973), (d) scores from Holland's self-directed search (Holland, 1972), (e) specifying certain occupational characteristics, or (f) specifying favorite high school subjects. Several modules permit structured searches for military programs, local jobs, apprenticeships, colleges, and other schools. In direct access, occupational information may be accessed using a brief description or a more extensive body of information (5 topics, 19 specific questions, totalling about 700-800 words). The user may also access information about education and training. Direct access is offered when the user signs on and allows access without seeing the instructional materials contained in the modules using these data bases. The user can also employ the search routines contained in several of the modules without going through the instructional sequences. The addition of a direct-access mode was an early revision, to offer quicker movement to desired information and to cut down on the length of time it took to complete the modules.

2. Subsystems. DISCOVER is an eclectic system, based on (a) the developmental approach to career guidance--Super's developmental stages (Super, Thompson, & Jordaan, 1971) and Tiedeman & O'Hara's (1963) decision-making paradigm, (b) the occupational classification systems of Holland (1973) and ACT (Prediger, 1976), and (c) values. The system contains one administrative module (the entry module), eleven "main line" modules and nine informational modules (submodules) that assist the user to assess values, interests and competencies, present occupational information, help in the exploration of the world of work, and provide instruction and practice in decisionmaking skills. These modules lead to the generation of a list of occupations based on self-knowledge, low-risk reality testing of occupational alternatives, crystallization of choices, and plans to implement career choices.

The explanation below applies to the grade 7-12 version of DISCOVER; the college-adult version modules are slightly different in name and content. This explanation describes the "longest" recommended path.

a. Entry. This module, an introduction or orientation to the system, assesses vocational maturity and recommends a path through the modules. That is, a person of low vocational maturity would be advised to begin with the earliest module and proceed in numerical order through all modules and submodules. The user can, however, enter the system at any point, and use it in any order. At its longest, this path leads into three didactic modules, each of which is followed by a practice module. Subsequently, four modules assist the user to generate a set of career options and, ultimately, formulate a career plan that can be implemented. Entry introduces the user to the system, including how to use the terminal, and explains DISCOVER's features. A career development inventory is administered and the results are used by the computer to suggest the most appropriate path through the modules of the system.

b. Understanding My Values. This didactic module assists the user to think about the nature of values, analyze personal values, and decide on actions that can implement them. The computer lists 10 to 15 values related to occupations. The user rates the personal importance of each of them and can request a list of occupations that might reflect the combination and weighting of the values. The summary of work values is stored by the computer for later use.

c. Playing a Values Game. This module gives the user an opportunity to apply what was learned in the previous module through a game resembling Monopoly. After an introduction to the concept of value weighting, the user is asked to place relative weights on three possible goals: income, recognition, and happiness. Winning the game requires reaching the user-established goal in each category and involves decisions about career choices, educational options, use of leisure time, or life style. Unexpected setbacks, opportunities, and financial costs are introduced into the game. Good decisions can add points toward the values for which the user is playing.

d. Learning to Make Decisions. This is the second didactic module. It attempts to teach a thoughtful decision-making process through use of a flowchart. A number of exercises designed to illustrate and provide practice in decision-making steps are presented. The flowchart is used to illustrate other, decision-making strategies (e.g., intuitive, impulsive, delaying, agonizing) and the user identifies his or her present decision-making style.

e. Practicing Career Decisions. In this module, the user applies what was learned in Learning to Make Decisions. A career decision tree is used as an organizing principle in understanding how decisions impact on occupational choice. The tree paradigm is used to (1) show the key decisions that lead to entry into a given occupation, (2) plot a user's course up the branches of the tree, (3) simulate the career paths of others, and (4) permit the user a low-risk, simulation opportunity to "play" his or her own life in a variety of ways by making practice decisions.

f. Learning How to Group Occupations. This, the third didactic module, shows the world of work through two organizing methods: (1) the data-people-things-ideas dimensions, and (2) Holland's hexagon. A number of exercises give the user practice using both classification systems. The user's responses are monitored so that instruction can be given as needed.

g. Browsing Occupations. This module uses the Holland hexagon as a means of exploring occupations. By touching any two points of the Holland hexagon with the light pen, the user can get a list of occupations that fit in the category represented by the particular Holland two-letter code. From that list, the user selects occupational titles. The computer then shows work duties, activities, and setting.

h. Reviewing My Interests and Strengths. In this module, the user selects one of two inventories, Holland's Self-Directed Search (Holland, 1972) or ACT's Career Planning Program (American College Testing Program, 1977). Both instruments are self-reports of interests, experiences, and competencies as they relate to work. The results are interpreted by the computer.

i. Making a List of Occupations to Explore. This module suggests several alternative ways to generate a list of personal career options: (1) relating occupations to personal work values, (2) using the results of the Self-Directed Search (Holland, 1972) or the Career Planning Program (ACT, 1977), (3) selecting titles from an off-line list of occupations, and/or (4) combining selected occupational characteristics (e.g., salary level, place of work, level of training, degree of independence).

j. Getting Information About Occupations. In this module, the user can receive information about a job, its duties, benefits and limitations, educational requirements, future outlook, and suggested sources of additional information. The user can review his or her own student record (grades in related courses, related work or course experience, present rank in class, etc.). There is also an option to compare two occupations by calling up data about both occupations simultaneously. The user exits the module with a list of occupations in which, presumably, there is serious interest. This could be a refinement of the list with which the user entered the module, or it may be a completely new list generated through one of the suggested methods.

k. Narrowing My List of Occupations. This module is entered with the list of occupations from the previous module or a new list can be generated through selection of job titles from a menu or by searching the data base using job characteristics. This module is designed to help the user narrow the list by (1) providing additional occupational information, (2) comparing information about two occupations, and (3) analyzing the remaining occupations in terms of specific work values, desired level of training, and interests/competencies. Occupations no longer of interest are removed, and the remaining occupations are rank-ordered.

l. Making a Specific Career Plan. Presumably, this module is entered with the top selection (occupation) for which the user wishes to implement a career plan. The subsystem guides the user through four steps: (1) choosing the plan of entry into the occupation (4-year college, on-the-job training, community college technical program, private vocational schools, or the military), (2) considering the high school courses that can help implement this plan (the user can branch to "Request A Course," allowing registration for the following year, semester, or quarter), (3) reviewing role-testing experiences that the user has had in relation to this occupation (e.g., part-time jobs, extracurricular activities) (Note: Additional role-testing experiences are recommended if the student's experience appears inadequate), and (4) selecting a specific place or institution at which to implement the career choice or get training for it (e.g., a local company, technical school, community college, continuing education program, college, military program, or apprenticeship). Career planning can also include finding appropriate loan funds, grants, or scholarships.

m. Submodules. The fourth step listed above can include elaborate searches and interaction with the nine large data bases (i.e., the nine submodules that DISCOVER labels 8a through 8i). The user may enter the Making a Specific Career Plan module and go directly to any of these submodules or call up information about any of the schools or programs in the file without going through the entire module. One of these submodules provides answers to a large number of typical questions about the military and provides a search strategy to find specific programs within any military service that provide training needed for entry into a particular civilian occupation.

3. Movement Between Subsystems. Users can move freely between subsystems and this is frequently suggested by menu prompts. After the computer displays an item of information from a data base, it offers the user a choice of several information files and/or search routines.

4. Data Bases. All DISCOVER data bases contain national information, but DISCOVER software allows user institutions to add local information as desired. The following data bases are included: (a) occupational information (over 400 occupations), (b) job-seeking skills, (c) local job information (optional, with local input), (d) financial aid (definition of terms, needs assessment, sources), (e) apprenticeships (general questions, local programs), (f) 4-year colleges, (g) community and junior colleges, (h) graduate and professional schools, (i) technical and specialized schools (state schools only), (i) continuing education, and (k) military information. Originally, the occupations in DISCOVER were drawn primarily from Holland's Occupations Finder (Holland, 1973). Occupations were added from the Occupational Outlook Handbook (OOH) (Department of Labor, 1973), the occupations list used with vocational interest, experience, & skill assessment (VIESA) (ACT, 1978) and the literature on a number of emerging occupations.

5. Results of Evaluations. A field trial found that students were highly favorable toward DISCOVER. However, users showed no significant gains on the career development inventory (CDI) (Super, 1975) nor on the assessment of career development (ACT, 1973). Students thought that using the system was fun and that it helped them relate information about themselves to occupations, provided a great amount of information, and was objective. Eighty percent of the users stated that they really enjoyed using DISCOVER and 75 percent thought it was fun and a good way to get information to help in choosing occupations. Parent responses to questionnaires were also very positive. Students using DISCOVER showed a significant move toward specification of both educational and vocational goals, as shown by data from a DISCOVER questionnaire.

6. Significant Developments. These include the development of a college-adult version, a major revision of DISCOVER I, and the development of DISCOVER II, DISCOVER III, EXPLORE, and ENCORE. (Parenthetically, it may be noted that a merger took place between the DISCOVER Foundation and the American College Testing Program (ACT), resulting in DISCOVER/ACT.)

a. College/adult version. This version was developed to enhance normal career development for members of these target groups. It includes 12 50-minute modules, similar in content to those of the original DISCOVER system.

b. DISCOVER I revision. In the course of several years, a proliferation of DISCOVER I systems were developed, some based on the original programs by the DISCOVER Foundation, some that were simply adaptations to fit various computer operating systems, etc. The resulting difficulty in supporting users caused DISCOVER/ACT to develop a new version of the DISCOVER I system that interfaces with the various IBM operating systems and file management software. The revision also changed DISCOVER into a modular system, with less required computer memory. The result was that all users have the same set of DISCOVER I programs, and DISCOVER/ACT is able to selectively modify or add modules of the DISCOVER I system as enhancements are made. A 2-year and graduate school search and information file will be available as update material in late 1983.

c. DISCOVER II. This system, a recent development, was modeled after the original system (DISCOVER I). It is similar in content and career development process, with equivalent data bases and search strategies. Some of the subsystems (modules) were extensively modified and two new submodules were added to module 8: (1) Midcareer Job Changes, and (2) Two- and Four-Year College Transfer and Articulation. The system accepts scores from off-line instruments (including the Armed Services Vocational Aptitude Battery (ASVAB)). More significant changes include the following:

(1) The system is based on a stand-alone microcomputer capable of handling one to four terminals and a printer.

(2) Plans have been made to include additional videodisc material.

(3) The CRT has been replaced by a color TV set to handle both text and pictures.

(4) The instructional and simulation material have been greatly reduced.

(5) Additional occupational access strategies have been added. It requires between 4 and 6 hours to go through all sections and subsections.

As of July 1981, DISCOVER II could run on selected minicomputers (IBM Series I, several DEC Models, Data General Eclipse) and microcomputers (any S-100 bus-based micro operating under the CP/M 2.2 operating system, the APPLE II-Plus, or the TRS-80 Model II). Some configurations, however, are incompatible with videodisc or color monitoring. DISCOVER II has four separate sections, each of which includes several distinct subsections, and each of which can be used independently. These subsections are listed below:

(1) Self-Information, including assessment of interests, assessment of abilities, and assessment of work-related values.

(2) Strategies for identifying occupations, including entry of interest inventory scores (obtained offline), entry of aptitude scores (obtained off-line), selection of occupational characteristics, and selection of college majors or high school/vocational technical programs of study.

(3) Occupational information, including learning about and browsing the World of Work, and detailed information about 425 specific occupations.

(4) Searches for educational institutions, including graduate schools, 4-year colleges, 2-year colleges, technical/specialized schools, and job bank.

In DISCOVER II, the user has direct access to any section or subsection without the necessity to complete any previous modules. If any have been completed, stored data can be called up in other modules. The system will (1) store a user record to keep track of system use, (2) print any display at the user's discretion, (3) scroll back as many as three displays and erase variables already selected, (4) permit a "Why Not?" function on all searches (to question why occupations were not included), (5) exit from any display and sign off, or branch to another part of the system, (6) display up to 30 occupations or educational institutions identified through a search strategy, and (7) provide a short evaluation questionnaire after each use, collecting all user responses.

A first-time user goes through an orientation module that gives an introduction to use of the hardware and an overview of system content. In subsequent system use, this material is not provided unless requested. The system builds a user record during first use (identification number, date of birth, and first name) and on subsequent uses welcomes the user by first name and reviews past uses (names of modules used and/or occupations identified). A total system directory is then presented, allowing movement to any module. Upon exit, modules used are recorded in the individual's record.

A demonstration version was programmed by OnLine Computer Systems for the American Society of Training and Development (ASTD) Convention in San Antonio, Texas in May, 1982. This demonstration, as well as the system itself, runs on the IBM Personal Computer with a hard disc.

d. DISCOVER III. This system is now under development and includes five modules: (1) Understanding Career Development and Change, (2) Self-Assessment, (3) Information Gathering, (4) Decision Making, and (5) Action Planning. For greater effectiveness, each DISCOVER III system can be localized to provide titles and descriptions of specific positions within an organization as well as information on particular career paths. This localization will be provided by Counseling Systems, Inc. under an agreement with DISCOVER/ACT. DISCOVER III was scheduled to be field-tested at the Sun Oil Company Corporate Headquarters in Philadelphia in 1983.

e. EXPLORE. DISCOVER/ACT has developed a new software package called EXPLORE. This streamlined version for college students is similar in content but much shorter than DISCOVER I, and is designed for operation on minicomputer systems (e.g., Hewlett-Packard 3000, Data General Eclipse, several systems marketed by Digital Equipment Corporation, and IBM Systems 34 and 38). EXPLORE provides the flexibility of multiple terminals, either through direct line attachments or on dial-up. EXPLORE uses the Unisex edition of the ACT Interest Inventory (UNIACT) (Lamb & Prediger, 1981), rather than self-directed search (SDS) (Holland, 1972). Otherwise, it includes all occupation search capabilities found in DISCOVER I and uses essentially the same data bases. Further work on EXPLORE has been subsumed within DISCOVER II minicomputer configuration development, esentially combining the two systems.

f. ENCORE. DISCOVER/ACT received a grant from the Council for Advancement of Experiential Learning (CAEL) to develop a computerized guidance system specifically for adult students. The result was ENCORE, a five-part computer-assisted system designed for adults who have had work or life experiences that might deserve college credit and who want to explore career and education options. Adults can identify the roles they have assumed, what they have learned through their experiences, and what careers might be especially suitable for them. The system helps adults organize their learning in a portfolio that can be presented to a college for evaluation, and it helps them find out about schools that grant credit for experiential learning. ENCORE links with both DISCOVER II and SIGI. To go through all five modules completely will take the user about 3 hours. Most users use only part of the system at one time and return for other sessions.

g. DISCOVER adaptation. Finally, a feasibility study for the State of Illinois recommended (in addition to the adoption of DISCOVER) adapting DISCOVER to run on PLATO (Wagman, 1980), to combine the advantages of CAG and CAI.

7. Present Use. DISCOVER I, the mainframe computer configuration, is in use at over 50 institutions (schools, colleges, universities, community guidance centers, etc.). DISCOVER II (micro) is in place at about 70 institutions. The DISCOVER II (mini) version is still under development. DISCOVER III was scheduled to be field tested beginning about April 1983.

DISCOVER has recategorized its systems as follows (Harris-Bowlsbey, 1983, p. 5):

New Name	Former Name	Target Populations
DISCOVER for Mainframe Computers	DISCOVER I	Secondary students, postsecondary students
DISCOVER for Minicomputers	EXPLORE	Secondary students, postsecondary students
DISCOVER for Microcomputers	DISCOVER II	Secondary students, postsecondary students
DISCOVER FOR Adults (for microcomputers)	ENCORE	Adults in educational settings
DISCOVER for Organizations (for microcomputers)	DISCOVER III	Adults in business and industry

8. Implications for Use in Military Recruiting. DISCOVER has several features contraindicating its adoption for use in military recruiting:

a. Though it does have a military work module, it does not deal with unique military occupations, or with occupations in general vis a vis a military environment.

b. Terminal time of 4-5 hours with DISCOVER II is much too long; DISCOVER I's time of 15-20 hours is out of the question.

c. Use of a light pen would increase initial cost and add to maintenance expenses.

d. DISCOVER depends on repeat visits for ongoing guidance.

e. Use of copyrighted material would subject military recruiting services to significant costs for license or royalty payments.

DISCOVER does, however, have several features that should be considered in the design of a military CVG system:

a. The number of ways by which an occupation may be accessed is potentially of great value in counseling career-naive applicants, particulary in a sales setting.

b. The microcomputer focus (DISCOVER II, DISCOVER III, and ENCORE) has demonstrated the feasibility of microcomputer-based CVG systems.

c. The career maturity screening accomplished in the entry module would be most helpful in dealing with young applicants for enlistment, as would the branching strategy that hinges on this assessment.

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D. Information System for Vocational Decisions (ISVD)

1. Description. Perhaps the most pioneering attempt at CVG was undertaken between 1966 and 1969 in a joint effort by the Harvard University Graduate School Of

Education, the New England Education Data Systems, and the Newton, Massachusetts Public Schools. In ISVD, a counselor was always included to some degree in the overall process of guidance. Actually, as conceived by the designers, the computer was but one component of a tripartite "system" that included the individual, the computer, and the counselor. ISVD's major objective was the improvement of vocational decisions through the use of a computer-based training system. The desired end result was for the user to internalize the process created in interaction with ISVD, designing and building his or her own "information system for vocational decisions." From childhood to old age, ISVD would be available for further assistance in "building one's own system."

ISVD was innovative in that users provided much of their own monitoring, and the system was to use conversational English. Founded on Tiedeman and O'Hara's (1969) career decision-making theory, ISVD sought to provide an ideal decision-making environment wherein, by interacting directly with the computer in a natural language, users would exert more control over the counseling process, having more freedom to select activities and to enter personal data than with other systems. ISVD would provide users with career information, career decision-making instructional units, and monitored decision-making practice. In addition to responding in a natural language, the user could prepare his or her own instructions to the computer (with the computer then executing functions that were not originally programmed).

ISVD was designed for an RCA Spectra 70/45 in time-sharing mode and was to include a variety of components: CRT, teletypewriter (for hard copy), movies, and color slides. An early attempt at tape-recorded sound was abandoned. Plans included the possibility of several individuals using the system at one time. ISVD used both direct and structured search. Almost all movement paths through the guidance process were optional.

2. Subsystems. ISVD had a network of computer routines, called scripts, that contained text for display, rules for presentation of that text, and commands to activate attached audio-visual materials. Access routines called EXPLORATION, CLARIFICATION, and REVIEW engaged the user in behaviors paralleling the Tiedeman-O'Hara paradigm. The description given below assumes that the user selected the "longest path" each time.

a. Introduction. This subsystem introduced the equipment and the conceptual nature of the total decision-making process.

b. Review. This subsystem recapitulated previous system use. More significantly, it elicited responses from which were extrapolated decision rules (from a synthesis of prior prediction statements and user decisions). These rules were then added to the user's own individualized information system that would be used in subsequent sessions (and, hopefully, internalized).

c. Orientation. This subsystem queried users as to whether they knew what they wanted to do. If not, the system, after checking the individual's personal file, offered suggestions and helped choose an activity. Playing the Life Career Game was included as an option.

d. Exploration. In the subsystem under this controlling script, the user could explore any number of alternatives and begin to crystallize preferred alternatives with an understanding of why these were preferred over others.

e. Clarification. The purpose of this subsystem was to test the individual's strength of commitment. Major activities determined if (1) crystallization of preferences and choices had taken place, (2) the individual was aware of them, and (3) they were realistic.

f. Summary. This subsystem summarized the activities engaged in during current use and the results of decision-making, if any.

3. Movement Between Subsystems. Users at all times had full access to all routines and data bases without any intervening process. Particularly, shifting between Exploration and Clarification was expected and encouraged.

4. Data Bases. Extensive and elaborate data bases included several million elements of information potentially relevant to career choice. The occupations data base was organized along several dimensions (50 facts about each of 850 occupations, organization of occupations by several classification methods, etc.). ISVD included 13 data bases related to 7 search files (with plans for more data bases as needed):

a. Education file (including college, trade school, junior high school data bases).

b. Military file (including Army, Navy, Air Force data bases).

c. Occupation file (including occupations and Dictionary of Occupational Titles (DOT) (Department of Labor, 1966) data bases).

d. Student file (including Newton (public school) data base).

e. Inquirer file (including Newton inquirer data base).

f. Placement file (including Harvard and Newton job data base).

g. Family file (data bases not yet developed).

5. Results of Evaluations: ISVD was developed only to a point called Prototype I. Only a limited laboratory trial of a few components was ever conducted (in 1969) and the results were mixed. In general, the software needed extensive expansion and debugging.

6. Significant Developments. None.

7. Present Use. Termination of funding precluded further development of ISVD, and no version was ever field tested. No work is in progress.

8. Implications for Use in Military Recruiting. ISVD represents a very complex and costly approach to the developmer of a CVG system, one that is conceptually superb and no doubt presages future directions in this area. It has little relevance, however, for the more immediate concerns of CVG in a military recruiting environment.

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(See also Cairo, 1977 for listing of 4 Summary Reports and 36 Technical Memoranda on ISVD.)

E. System of Interactive Guidance and Information (SIGI)

1. Description. SIGI, developed at the Educational Testing Service, is one of the most sophisticated CVG systems. Initially tailored to the options available to students enrolled in, or planning to attend, 2- and 4-year colleges, SIGI has subsequently been made available by several of the using colleges to high school students and CETA centers. SIGI is not an eclectic system but, rather, centers around identification and clarification of the user's values and the teaching of a decision-making process or strategy for information processing. It was designed to assist students in making informed and rational career decisions. In a human-computer interaction, users examine personal values, review occupational information, call up predictive data, formulate plans, and learn strategies for career decision-making. SIGI can be used without assistance: Everything a user needs to know to operate the system appears on-line. Scripts have been written at the 8th grade level. It utilizes a minicomputer, CRT display, keyboard terminal, and printer. The latter furnishes hard-copy output at the user's command.

Originally designed for use on mainframe computers (e.g., PDP-11), it has been converted to operate on many other systems from large CDC Cyber 70 and DECSYSTEM 20, through VAX 11/780, Data General Eclipse C-150, Univac 1100/82, and Burroughs 1000 and 6800 systems to small Prime 400 and Xerox 560 systems. SIGI is now available for the TRS-80 Model II microcomputer. Interestingly, SIGI has been adapted to an Apple II computer and coupled with a Votrax Type 'N Talk, converting computer output to sound, and equipped with a special keyboard. The result is a system usable by the handicapped ("A Computerized Career Counselor," 1982).

SIGI uses both structured and direct search, with a first-time user entering the system through structured search and proceeding to direct access. Repeat users can enter through either mode and move from subsystem to subsystem at will. Accessing commands are entered by choosing from a menu.

2. Subsystems. A user is first presented with an on-line introduction module that introduces key concepts and the purpose of each of the major subsystems. There are six major subsystems: Values, Locate, Compare, Prediction, Planning, and Strategy. Values and Locate are in the structured search mode. Not all user organizations use all subsystems.

a. Values is used to help the user define personal values in relationship to occupations. The user weights each of 10 values and plays a values game designed to confront the user with values dilemmas and make the user consider the values and their effects by dramatizing value choices, introducing new values dilemmas, and periodically graphically summarizing the choices made. Weights are assigned to each of the 10 values by distributing 40 points among the ten values. Opportunity is given after each round of the game to reweight the values. Values are relative to each other: More weight on some reduces that on others.

b. In Locate, the user identifies occupations that fit the personal values. He or she selects five values and specifies the interest category or minimum pay acceptable. In response, the computer displays a list of occupations that meet or exceed the specifications. SIGI may be queried as to why some particular occupation did not appear on the list, and the computer will identify the specification that excluded it. Specifications and values may be changed to generate a new list. SIGI waits until all specifications have been entered before generating the list.

c. Compare employs a direct-access mode in which the user asks questions about three occupations at a time and receives specific occupational information, for comparison purposes. Three occupations and a set of up to 5 specific questions (out of 37 possible) to ask about them are selected from the menu. An "equal to" rule is applied for "interest field." The computer follows a "greater than or equal to" rule for all other selections. SIGI responds with answers for all three occupations, shown simultaneously in parallel rows. After each set of questions, the user can choose another set or change one or more of the occupations being compared. The relative desirability of each occupation can be assessed by putting values and occupational information together in summary form.

d. Prediction is a local option (essentially consisting of experience tables based on local data) that provides users with probabilities for success in programs designed to prepare them for entry into selected occupations. The user is asked to specify a college program or major. SIGI provides the name of the "key course" in the program and then asks the user to input test scores (if available), data on past performance, self-ratings on several factors, and a personal estimate of final course grade. Scores on almost any

standardized test generally administered by a college can be entered. Self-ratings and estimates are assisted by information that SIGI provides on course content and course grade distribution. After receiving the data from the user, the computer responds with the user's chances (in 100) of receiving a course grade of A, B, C, and below C in the course. The prediction algorithms were developed based on ETS research on test-free prediction (Norris, 1976; Norris & Chapman, 1976).

e. Planning is a subsystem designed to help the student figure out how to get from his or her present position to the desired occupation, providing steps and pathways into a given occupation. Originally, Planning had been a rudimentary section relying on local, tailored options to supplement it. More recently, development of a "universal," generalized version was undertaken. While this will necessarily entail some loss to users vis-a-vis tailored data files, it will make SIGI more immediately usable and less expensive by obviating the necessity for extensive local research. It will also be useful to those needing to transfer from one college or university to another. (Using organizations still have the choice to develop local option versions.) In this subsystem, the user specifies an occupation, and the computer displays the program for entering each occupation and lists licensing and certification requirements and sources of financial aid. More detailed educational and training information contained in the local options is accessed the same way. Financial aid information can be accessed without specification of an occupation. Names of courses are given to be used in the following subsystem.

f. Strategy brings together personal values, occupational information, and predictions for the three selected occupations at once. This subsystem introduces the idea of risk. Opportunities for various kinds of satisfaction are assessed. SIGI provides an explicit algorithm for evaluation of the occupations on a personally-narrowed list in terms of the rewards they offer and the risks of attempting to enter them. The user may reweight his or her values again. Then the sum for each occupation is multiplied by the probability. The computer displays a table showing the desirability of a career and the probability of success in it (the combination of subjective utility and objective probability) or, in other words, the expected degree of opportunity the occupation provides to satisfy the particular value. The weight for each value given by the user is multiplied by the rating (the degree of opportunity) giving an index of the occupation's overall desirability for that user. The user considers the necessary entry steps for each occupation and estimates the probability of successful entry. The Prediction subsystem, local option, can assist by estimating the user's chances in 100 of getting a particular letter grade in a "key course" required in preparation for the occupation. The same 10 values are thus used to access, discuss, compare, and select the occupations, and the occupations are compared as value-satisfiers. A caveat is displayed against necessarily choosing the occupation with the highest index.

3. Movement Between Subsystems. The list of occupations formed in Locate can be used in Compare, Planning, and Stragegy. The weights assigned in Values are used again in the Compare, Locate, and Strategy subsystems. The best entry route to an occupation displayed in Planning is called up in Strategy. Where both a tailored Planning subsystem and a Prediction subsystem have been developed, the program to be selected in Prediction to meet the preparation requirements of an occupation is determined by the Planning subsystem.

4. Data Bases. SIGI is marketed in two versions: Basic SIGI System and Institutional Specific. There are provisions for data bases that are tailored to local conditions, in addition to those provided by ETS. Data files included in SIGI are: (a) Compare (national in scope, with information on more than 180 occupations), (b)

Prediction (a local, optional data file providing probabilities of letter grades in "key courses" needed in preparation for certain occupations), and (c) Planning (a national data file presenting the best entry paths to occupations and local options for recommended programs at the user's college, other institutions of education and training, and sources of financial aid). The latter has been expanded and now includes course descriptions for each of 275 programs of study.

SIGI originally had information on two types of occupations, those requiring a 4-year college degree and those requiring less education. These occupations were selected by attributes in common with community college curricula and the presence of significant numbers in the occupation. Later, occupations requiring no college were added because users repeatedly expressed interest in them while using SIGI. Between 200 and 250 occupations are represented. Occupations are added in response to user interest or when indicated by significant employment trends or occupational field growth. Occupational, course, training, and requirements information comes from many sources, including (but not limited to) government publications, surveys, professional associations, research publications, and local user input. The regression equations used in Prediction are computed by SIGI staff, from data collected by the individual college using SIGI manuals and worksheets. Local option data requirements are researched by the using institution.

5. Results of Evaluations. SIGI was pilot tested at Mercer County (NJ) Community College in 1972-73. Overall, students reacted favorably and understood the system. SIGI increased their awareness of values and the relationship of values to their careers. SIGI was found to be adequate to student needs. Results indicated that the system was clear in its directions, flexible, and accommodating to individual differences. The average time through the system was about 3 hours. Each value used in the guidance program was found important and was relatively independent. While many users specified a particular subsystem to be most useful to them, all occupational information categories were accessed and all available predictors were used.

Following the pilot testing, nationwide testing began at 2-year and 4-year institutions in California, Florida, Illinois, Michigan, New Jersey, and Texas. SIGI ran smoothly in the trials. It was enthusiastically received by both staff and students and it was concluded that SIGI was indeed effective in increasing students' mastery of career decision-making competencies. SIGI was credited with increasing autonomy and rationality in career decision-making and was recommended by students to their friends. Increased clarity in understanding personal values, the process of and inputs to decision-making, and the accuracy of occupational information were found in the using student groups. Every subsystem was found most important by some users. Counselors also supported SIGI, saying it helped them use their time more effectively. During the field trials, average time for using SIGI was 4 hours, usually in 2 or 3 sessions.

A 3-year study of the SIGI system was conducted at the University of California at Irvine (UCI) in 1976-1979. The SIGI project demonstrated that a computerized system of values clarification and information processing can be provided effectively and efficiently. It is estimated that SIGI provided more than 11,500 hours in released counselor time over the 3-year period. At 18 months, user reaction was overwhelmingly positive. Of the 2937 students (aged 17-70, 43 percent female) that made use of the system, 97 percent said they became significantly more aware of their values; 93 percent, that the system was very helpful in identifying occupations consonant with their values; 95 percent, that the system was very helpful in finding occupational information; and 94 percent, that the system was very helpful in learning how to make career decisions. Many

students saw SIGI's main benefits to be values clarification and easy access to occupational information. Similar results were reported by Pasadena City College and the California State Polytechnic University at Pomona.

During the third year of testing at UCI, SIGI was used in the Student Outreach Program with about 70 nontraditional, reentry women enrolled at two local community colleges. Overall, reactions were positive, with the values subsystem considered particularly helpful. Users suggested additional values be considered. It was concluded that nontraditional students require a more thorough orientation, especially regarding the values subsystem, along with follow-up counseling to help in reality testing of their career goals.

SIGI was also used with 20 female clerical and support employees. These, similar to the reentry women, found the values subsystem very useful. Many found that SIGI had the effect of reinforcing their career choices. It was concluded that, because these users were not seeking a first career or a career change, their reactions to many of the subsystems were mixed.

6. Significant Developments. A joint undertaking by ETS and CAEL, Project LEARN (Lifelong Education, Assessment, and Referral Network) has resulted in a version of SIGI designed to help out-of-school adults make career changes or to advance in their present occupations. The system begins by identifying user needs and branching into appropriate paths determined by their objectives. These objectives might be job change, advancement, change of occupation, or entry or reentry into the job market. Significant parts of the system will employ assessment methods in the areas of values, aptitudes and skills, experience, and personal resources. A function called Strategy will tie together the outcomes of assessments and information retrieval activities and assist in decision-making; leading, in turn, to planning activities. Automatic data collection by the computer will make possible hardcopy output for user retention.

On-line storage will include information about occupations similar to the original version of SIGI. Other data files include information on education and training, financial aid, and references to off-line printed materials on many subjects (e.g., preparing job resumes). Local information on such things as job opportunities, community services, and individual employers can be added to the SIGI data files. A set of utility programs allows an institution using the SIGI system to add local information without having to use a computer programmer.

7. Present Use. As of 1981, SIGI was licensed for use at some 200 institutions, including colleges and universities, high schools, libraries, and even student council organizations, in 20 states and the District of Columbia. (See Bruce, Varelas, & Shuman, 1982 for an example of SIGI's use in a career planning and placement setting.) With the availability of the microcomputer, SIGI should enjoy much wider use because of reduced hardware costs and ease of operation. Also, the capability of microcomputers has dramatically increased the use of SIGI in schools and libraries and offers opportunities for use in mobile vans in a "roving SIGI" concept.

8. Implications for Use in Military Recruiting. The SIGI system has excellent credentials and research support. It has proven itself effective. However, there would be major problems associated with its adoption:

a. SIGI was designed for college-level students, making it inappropriate for counseling into enlisted military occupations.

b. Terminal times ranging from 3 to 4 hours are completely unacceptable.

c. Licensing fees and royalties would impact unfavorably on use of SIGI in large-scale recruiting operations.

d. The local specification features of SIGI for adults, while an excellent service for its intended users, has little relevance for military recruiting.

Particular features of SIGI bear close scrutiny for their relevance to the design of a military recruiting CVG system:

a. The singular focus (in this case, values) and, hence, very coherent and logically simplified method used to select, compare, and consider occupations. Also, the repeated user appreciation of values clarification in all trials.

b. The ease of movement between subsystems.

c. Modular construction of subsystems, facilitating development, replacement, comprehension, and explanation.

d. Microcomputer implementation (in later versions).

e. Use of both structured and direct-search strategies.

f. Ability of SIGI to increase user responsibility for occupational consideration and decisions.

g. Ability to take into account the reason for using the system, found in SIGI for adults, may prove useful in placing a CVG system within the recruiting sales orientation if it can be adapted to a tool for assessing motivation (e.g., dominant buying motive).

h. The roving SIGI concept may have applicability to the use of a portable military CVG system at high schools, fairs, shopping centers, etc.

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II. MILITARY SYSTEMS

A. Automated Guidance for Enlisted Navy Applicants (AGENA)

1. Description. AGENA is the only attempt by the military research community to develop a CVG system designed expressly for the recruiting environment that has proceeded past the proposal stage. AGENA was designed as part of a more comprehensive prototype personnel accessioning system, the Navy Personnel Accessioning System (NPAS), that was to integrate the many and wide-ranging tasks subsumed in the military accessioning process (Baker, 1983a, 1983b; Baker, Rafacz, & Sands, 1983). AGENA cannot qualify as a CVG system in the strict sense, since it depended on external factors in the guidance process (e.g., ASVAB scores).

The AGENA system used interactive dialogue to lead Navy enlisted applicants through a logical, thought-provoking interaction, in which they (a) were introduced to the system and the microcomputer equipment, (b) proceeded with an adaptively-administered aptitude screening instrument, (c) progressed, via learning how to plan for a career and discover personal interests and aptitudes, and (d) ultimately explored a number of Navy entry-level occupations that matched their interests and aptitudes, with the opportunity to assess the options that were likely to be available during the subsequent personnel classification process at the military entrance processing station (MEPS).

Because an applicant must attain a minimum score on an ASVAB test composite to qualify for enlistment (and to enter certain occupational fields), AGENA included an aptitude screening instrument that predicted the applicant's Armed Forces Qualification Test (AFQT) score (a composite of ASVAB test scores). If a failing score was predicted, the recruiter could terminate the recruiting process.

Assignment prediction was another major component of AGENA. A mathematical model incorporated within the AGENA system considered several individual and organizational factors and, coupled with information on when the applicant was intending to go to the MEPS and take the ASVAB and when he or she wanted to enter the Navy, determined which entry-level jobs were most appropriate for meeting the individual needs of the applicant and the institutional objectives of the Navy. In addition, the availability of these entry-level assignments was predicted. AGENA was originally designed for a mainframe computer using time-sharing. The decision was made to employ a microcomputer configuration that included a video display terminal (VDT) and printer. All instructions were included in screen dialogue, and AGENA could be used by applicants without constant assistance by the Navy recruiter. AGENA used both structured and direct access, the latter restricted primarily to the recruiter.

2. Subsystems. The AGENA system was composed of nine separate modules, which are described below.

a. System Introduction, the initial module, was designed to familiarize the applicant with the operation of the computer equipment and to introduce the guidance system as a whole. Following an opening statement of welcome, the operation of the VDT was explained. The applicant was given an opportunity to practice using the control keys. Then a brief overview of the entire system was presented to provide the applicant with a "roadmap" of the system.

b. Aptitude Screening Test. Only those applicants who did not have scores on the ASVAB available used Module 2, which contained the Computerized Adaptive Screening Test (CAST) (Baker, Rafacz, & Sands, 1984). This instrument is used to predict an applicant's performance on the ASVAB (more specifically, the applicant's AFQT score), providing the recruiter with an index of an applicant's chances of qualifying for enlistment.

c. Interest Inventory. The third module contained the Vocational Interest Career Examination (VOICE) (Alley, 1978). The applicants' scores on 18 basic interest scales were presented on the VDT using bar graphs, providing the applicants with a visual indication of their measured interests, which they could use in subsequent Navy job exploration.

d. Career Planning. This didactic subsystem presented the concept and methods of planning for a career. If the applicant had not taken the ASVAB at this point, a discussion of ASVAB was presented, outlining the general purpose of the test battery and presenting a list and brief description of the ASVAB tests. Finally, the career planning session concluded by encouraging applicants to schedule an appointment for ASVAB testing, to assist them in career exploration, as well as for continuance on the AGENA system, as the next module required these scores.

e. ASVAB Interpretation. This subsystem interpreted the results of the ASVAB testing for the applicant. Initially, a list and brief description of the component tests was shown, together with an explanation of the meanings of score levels on the tests. Then the applicant's performance on the battery was interpreted in terms of strengths and weaknesses, using a bar graph presented on the VDT. The applicant was given an opportunity to obtain a hard-copy version of the bar graph.

f. Navy Jobs Available. Employing a person-job matching algorithm, AGENA calculated and displayed the top three assignment options (based on the person-job matching index) for the applicant's consideration (Kroeker & Rafacz, 1983). (See Baker, 1983b for a summary review of research on the AGENA prediction system.) The applicant was able to access the Navy ratings data base and obtain considerable information on any of the assignment options. If none of the top three assignment options appealed to the applicant, another set of three could be examined. Again, on-line access to the Navy ratings data base was available. This process continued until one of three conditions occurred: (1) the applicant found a job that seemed a good choice, (2) the options for which the applicant was eligible were exhausted, or, (3) a total of 15 jobs (5 sets of 3) had been examined. Before exiting from this module, the applicant was requested to choose one or two assignment options that seemed most promising.

g. Related Civilian Occupations. The substantial contributions that Navy training can make to total career development were discussed in this subsystem. It began with a brief discussion of the general value of Navy training and experience. Then, the applicant had on-line access to the civilian occupations data base. Descriptions of civilian occupations (or clusters of occupations) related to the Navy assignment opportunities that were selected were available on the VDT and as hard-copy output from the printer.

h. Session/Final Summary. This subsystem summarized the results of the present session on the system. If the applicant had completed the first seven modules, a final summary was presented. This final summary covered the results of all sessions on the system and included information on the aptitude screening test (CAST), the interest inventory (VOICE), the classification test battery (ASVAB), the Navy jobs explored, the jobs selected, and the related civilian occupations examined. All hard-copy output was personalized with the applicant's name, and included the name, office address, and telephone number of the Navy recruiter.

i. System Evaluation. The final subsystem sought to obtain the applicant's evaluation of the system. A series of multiple-choice questions were administered on-line to assess general satisfaction with the AGENA system. The information obtained was to be used as feedback to help modify and improve the system.

3. Movement between Subsystems. The guidance sequence could be entered at any point, but the movement between subsystems was essentially fixed and sequenced as set forth above. Later revisions might have incorporated more flexible access strategies.

4. Data Bases. AGENA included two main data bases. The Navy ratings data base included information on the entry-level Navy jobs in two formats. An abbreviated version designed for VDT presentation included five sections: general description, related civilian jobs, qualifications, working conditions, and Navy opportunities. An extended description, available in hard copy as an option, included the five sections of the abbreviated description and three additional sections that covered what the people in the rating do, sea/shore rotation, and the training provided by the Navy. The civilian occupations data base included descriptions of civilian occupations in five sections: general description, qualifications and training, pay and working conditions, employment outlook, and related Navy jobs.

5. Results of Evaluations. AGENA was never developed beyond a very truncated demonstration system. The latter performed quite well in several demonstrations during the summer of 1981.

6. Significant Developments. The CAST subsystem has been developed to operational capability, field tested, and will be incorporated in the Army JOIN system for use in all Army recruiting stations in 1983 (Baker, Rafacz, & Sands, 1983c, 1983d, 1984).

7. Present Use. AGENA exists only in a demonstration version, with programming limited to that purpose (except for CAST). No operational version was ever developed or field tested. R&D ceased when funding was cancelled in 1982.

8. Implications for Use in Military Recruiting. AGENA has data bases only for Navy occupations and their civilian associates, and algorithms specific to Navy assignment prediction. As such, its application to the Army recruiting environment is limited. This system was also incomplete as regards a CVG system and was dependent on external factors. AGENA remains, however, the only prototype for a military recruiting system. Its overall design and demonstration results should be considered in the developmental efforts toward a military CVG system designed for an operational, military recruiting environment.

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B. Army Education Information System (AREIS)

1. Description. The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) sponsored the development of a prototype, computer-based system that would provide information on military and civilian education programs to Army personnel as part of the Army Continuing Education Service (ACES). The result was a computerized counseling system developed under contract by the DISCOVER Foundation during 1979-1980. This system was developed on the basis of a needs assessment conducted at Army Education Centers located on Army bases throughout the world.

The system is a computer-based guidance system designed specifically for Education Center use. Originally, AREIS was programmed in PLANIT (Programming Language for Interactive Teaching) on the Army's UNIVAC 1108 Computer at the Edgewood Arsenal, Maryland. Subsequent to a field trial, AREIS was changed to a microcomputer configuration. AREIS hardware now includes a microcomputer, color monitor, and printer. AREIS software has been programmed for use on two multi-user microcomputers: (a) the DISCOVERY, a system selected as a second test microcomputer system, and (2) the Apple II-Plus system selected for the field test because major Army bases are acquiring Apple computers.

2. Subsystems. AREIS includes four subsystems. Three of the subsystems are counselee-oriented and use interactive dialogues focused on subjects selected by the counselee. The fourth stores counselee records and is accessible only by Education Center staff and counselors.

Counselees must enter through the Orientation subsystem. First-time users furnish demographic information to help construct a user record, including social security number (SSN), name (first name only), date of birth, time in service, time in grade, rank (or employment status), and approximate number of visits to the education center. Returning users enter their SSN only, bypassing the rest of the entry procedure, and go to the main directory or select which part of AREIS to use. All instructions for using the computer are presented on-line, in simple language. The subsystems are described below.

a. Orientation familiarizes the user with the equipment, provides information about the content of AREIS, explains the services of the Education Center, and gives an overview of ACES programs, including educational counseling and improvement, skill development and recognition, and support services. Brief descriptions of 16 ACES programs (e.g., apprenticeship, high school completion, and tuition assistance) may be called up by the counselee.

b. Self-Information helps the counselee to assess his/her work-related interests, aptitudes, skills, and values. Counselees may select from three assessment instruments. A list of a family of occupations is generated according to responses to the 90-item Unisex edition of the ACT (UNIACT) (Lamb & Prediger, 1981). An aptitude assessment enables the counselees to compare their aptitudes with those of their peers. The values assessment assists the counselee to clarify work-related values and produces a list of occupations keyed to these values. A summary consolidating all elements of counselee self-information is generated by the computer.

c. Goals and Planning helps the counselee establish educational and vocational short- and long-range goals, and provides information on ACES programs that may be useful in achieving these goals. Counselees select from a list of 12 preprogrammed, short-range goals that can be attained while serving in the Army (e.g., improving basic skills, getting promoted, and improving MOS skills). There is also a menu of long-range goals that can be achieved during or after an Army career (e.g., making a vocational choice, completing the next step in education, and planning a military career).

d. Counselor-Administrator provides counselors with updated educational and vocational information for use in counseling. All data bases can be accessed through this subsystem. Counselee records are also maintained in this subsystem, including the record of each counselee's Self-Information and Goals and Planning activities. This subsystem is accessible only by Education Center staff, using a password.

3. Movement between Subsystems. After using the Orientation subsystem, counselee may move from Self-Information to Goals and Planning or vice-versa (or between any of the subsections of these subsystems) at will.

4. Data Bases. AREIS contains (a) civilian occupations (information on more than 400 occupations), (b) military occupational specialties (MOS) (indicating correspondence of MOSs to civilian occupations), and (c) a master schedule (containing a locally maintained list of all courses offered on or near the post).

5. Results of Evaluations. A field tryout of selected portions of the four AREIS subsystems was conducted at the Ft. Sill, Oklahoma, Education Center in April 1980. AREIS was delivered to Ft. Sill in a time-sharing mode from the Edgewood Arsenal. This tryout included: (a) Orientation (an overview of AREIS, Education Center Services, and ACES programs), (b) Self-Information (on-line administration, scoring and interpretation of the UNIACT), (c) Goals and Planning (the goal, "To Complete the Next Step in Education," designed to provide information about educational offerings on or near post), and (d) Counselor-Administrator (a demonstration of the administrative files capable of being maintained by AREIS, including a master schedule of courses and soldier summary report data).

Field tryout participants included 12 counselors and 64 counselees. Counselees completed on-line surveys prior to using AREIS and after using each subsystem. These instruments were designed to determine the users' attitudes on the usefulness, clarity, and interest level of each subsystem. Counselees regarded the computer and the AREIS content as useful for educational and vocational planning. Counselors rated the information provided by the AREIS subsystems as useful and accurate and responded favorably to computerized delivery of educational information.

Operation of the software and hardware was also evaluated. Some limitations of PLANIT were exposed, including the inability to (a) search data files, (b) clear the terminal screen completely, and (c) remain in contact with the mainframe after a 5-minute delay between counselees. A cost/benefit analysis considered alternative delivery systems for AREIS. The hardware configurations compared included (a) a mainframe computer (such as the one used during the field tryout), (b) a distributed network of minicomputers, and (c) stand-alone microcomputers. As a result of the analysis, a microcomputer configuration was selected for future AREIS development and a full field test on the basis of (a) maximum cost feasibility, (b) minimum technical and clerical support requirements, (c) ease of operation by nontechnical personnel, and (d) ease of installation overseas.

6. Significant Developments. A full evaluation of the complete microcomputer version of AREIS was conducted for 9 months, beginning in the summer of 1982, at Education Centers at Fort Gordon, Georgia; Fort Meade, Maryland; and Mannheim, Germany. Questions addressed during the field test were: (a) AREIS hardware and software operation, (b) the appropriateness of the multi-user microcomputer configuration for Education Center needs, (c) counselor and counselee reactions to AREIS and to computerized career and education information, and (d) the impact of AREIS on Education Center operations.

7. Present Use. AREIS is still under evaluation by the Army, with results from the field test expected shortly.

8. Implications for Use in Military Recruiting. AREIS has several features contraindicating its adoption for use in military recruiting:

a. It was designed with a heavy emphasis on education and career orientation (for individuals already in service) and is therefore not suited to entry-level counseling, without extensive modification.

b. The occupational classifications fail to consider adequately military occupations that include huge segments of the Army (or other services, for that matter). Specifically, no consideration is given to infantry, artillery, or combat arms in general.

c. The values clarification portion is inadequate in that it can result in profiles with all values equivalently rated. That is, weighting of values in this system does not result in ipsative score reporting. Therefore, no relative importance of values is indicated.

d. AREIS employs assessment instruments requiring licensing and royalty payment, which would make it very costly in an environment where it is used by large numbers of people in a large number of locations (e.g., military recruiting).

e. AREIS presumes the presence of trained counselors and relies heavily on counselor intervention in the guidance process.

Certain AREIS characteristics are important for consideration in future research:

a. It demonstrated counselor and counselee acceptance of computerized guidance functions in a military environment (during the pilot test).

b. It is a microcomputer-based system capable of counselor-free operation, to the extent of its stated purposes.

c. Assuming satisfactory results in the field trial, it will have demonstrated the utility of microcomputers in an environment logistically somewhat similar to recruiting (i.e., geographic dispersion, multiple users, frequent use, etc.).

d. While the orientation is too broad for recruiting purposes, the counselee subsystems do reflect an excellent overall strategy of guidance flow: personal information, occupational/educational information, and planning.

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C. Officer Career Information and Planning System (OCIPS)

1. Description. OCIPS was developed by ARI (with contractor support), beginning in 1971, to aid Army officer career development. OCIPS was designed to be a prototype, interactive, computer-based system that provided information for career planning by junior officers. The aim of OCIPS was to induce greater responsibility for career decision-making, increase knowledge of the career-enhancing potentials of various assignments, increase career satisfaction, better the officer-to-job fit as a result of self-assessment vis a vis the occupational milieu, increase career management efficiency, and free career managers to concentrate on counseling.

OCIPS was designed on a UNIVAC 1108 mainframe computer located at Edgewood, Maryland, with a terminal at Arlington, Virginia connected by phone lines. The system used a printer for providing hard-copy summary data to users.

OCIPS was not a CVG system, as it depended on major, required off-line activities to complete its guidance process. Conceptually, OCIPS was founded on the conclusions of Super's (1971) longitudinal study of career development, where emphasis is placed on (a) the inevitability of choice, (b) choice as an implementation of values, (c) the occurrence of contingencies and discontinuities, (d) the necessity for clear-yet-tentative goals, and (e) the varying concerns of different life stages. OCIPS, therefore, was designed to include exercises in skills and values clarification, career strategy formulation, choice point identification, and personal career monitoring. A large part of this included teaching the principles of career planning, providing information about the Army officer career structure, and providing data on alternate specialty designations that junior officers are required to select.

2. Subsystems. The system consisted of seven interactive dialogue subsystems. The user's path through the subsystems was determined by responses to questions or by selection from among alternatives posed at several choice points. Each subsystem was self-contained and connected with the other subsystems through an executive monitoring system. They are described below.

a. Signon. This subsystem introduced the system, provided instruction on use of the terminal, and requested a variety of identifying data (e.g., military specialty, type and level of civilian education, and current military status).

b. Foresight. This was the initial didactic subsystem, designed to introduce the user to long-term career planning and the decision-making process. It began with the

concept that individuals can influence their career progress if they know what they want and how the occupational system works. The basic career concepts were assigned code names: (a) Must (choice is inevitable), (2) Value (you have to know what you want), (3) Surprise (unexpected events happen even if you plan), (4) Tension (simultaneously firm and tentative planning), and (5) Stage (predictable life changes). The user could look through any of the explanatory illustrations for each concept, as desired. The subsystem integrated the concepts in a sample career path that exemplified an officer making choices and confronting situational changes at different career stages.

c. Overview. This information subsystem described the occupational environment and opportunity structure and included the Army's overall plan for officer career progression. It attempted to make the user aware of those factors that can influence that progression, including (1) changes in needs, goals, and objectives of the Army, (2) military and technological changes, (3) timing of career decisions, (4) officer evaluation reports, (5) military education, (6) alternate specialty assignment, and (7) civilian education and training. A series of off-line charts was used to identify career patterns and determinants and to answer a series of typical questions. This subsystem reinforced the concepts introduced in Foresight and added some Army-specific concepts such as officer responsibility, training, etc. The user's comprehension of how the system works was expanded in a way designed to help the user incorporate an understanding of officer career progression into personal planning.

d. Captain's Introduction. A substitute introductory subsystem was designed for users already familiar with the Army career progression system (i.e., captains and above). This subsystem included an abbreviated version of the information in Foresight and Overview. It would replace both Foresight and Overview for captains and above.

e. Alternate Specialty. This subsystem provided the user with information on important choice points in an Army officer's career. Users explored the fit of the various alternatives, given their own descriptions. This subsystem made the alternate specialty data base available to the user and offered suggestions on interpretation. The user could explore his or her characteristics, compare them with those of peers for whom any particular specialty was designated during the previous year, and then integrate this information into a career strategy.

f. Self-Assessment. This subsystem helped users describe themselves in relationship to the environment, clarifying "what they want" by using a representative list of skills and values to create an individualized profile based on preference and performance (skills), and subjective importance (values). The list was a combination of analyzed Army officer job performance dimensions, and available inventories of career skills. The values list was a combination of work value inventories, lists of values used in industrial personnel development programs, and values drawn from ARI surveys. Once the profile was created, the computer offered suggestions for integrating self-assessment into planning, and the user evaluated previous and anticipated assignments in light of this profile.

g. Career Strategies. This subsystem helped users to integrate information to make choices and decisions, and evaluate career progress through the use of exercises in setting long-term goals and by translating goals into plans for more immediate objectives. A didactic portion taught that: (1) goals provide the basis for long-term planning and can

be arrived at by assessing Army career opportunities and personal characteristics, (2) long-term goals are best attained by achieving intermediate objectives, and (3) definite plans for achieving intermediate objectives provide the link between career planning and the achievement of long-term goals.

The process of creating a career strategy was facilitated by use of a career planning game--SCOR--that included significant aspects of an officer's career: military specialties, education and training, skills, job performance, rank, contribution, assignments, family, and values. The game used an off-line playing board--SCOR-BOARD--for charting hypothetical career progression. Decision points required the player to deal with four career issues: the inevitability of Surprise, the necessity of Choice, the awareness of Opportunities, and knowledge of Requirements. The player started the game as a second lieutenant, selected menu-elicited goals, sought to move toward those goals in a series of computer-prompted decisions, and arrived at an end point that signified goal achievement. At the conclusion of the game, the principles of creating career strategies were reviewed and the user was presented with the Career Planning Wheel. This off-line chart was similar to the SCOR-BOARD, but made a more detailed representation of an officer's career. The user could access computer-based career data related to the year of commissioned service in each topic on the wheel.

After using SCOR and the Career Planning Wheel, the user reviewed his or her own career goals in light of eight criteria for effective career planning and revised goals until they satisfied the criteria. Revised goals were then translated into action plans for intermediate objectives. The subsystem offered suggestions (e.g., choosing a specific standard for gauging success, identifying resources and barriers, setting checkpoints and deadlines, etc.). Users exited this module with clarified career goals; pretested, intermediate objectives; and action plans.

3. Movement between Subsystems. Progression through the subsystems was determined by response to query or decision-point choices. It appears, however, that the subsystems could have been entered by direct access.

4. Data Bases. A data base relating officer characteristics and preferences to alternate specialty designation included information about the alternate specialties that were available, how they are designated, and how career plans can influence them.

5. Results of Evaluations. Four of the seven subsystems (Signon, Foresight, Overview, and Alternate Specialty) were field-tested on 52 company grade officers at Ft. Benning, Georgia. Each officer was administered a pre- and post-use instrument measuring (a) knowledge of relevant information, (b) attitude toward the computer as a guidance tool, and (c) the clarity, accuracy, and usefulness of each subsystem. A local-use debriefing session was also conducted. The results of the field trial showed that users found the content of the subsystems to be interesting, accurate, useful, and understandable and gave highly favorable ratings to the use of the computer as a method of transmitting career information. Users reported a decreased need for career information and an increased level of certainty and satisfaction with alternate specialty preference. The style of the dialogues was considered appropriate.

6. Significant Developments. Several adaptations and expansions of the system have been suggested: (a) OCIPS could be adapted for use by field grade officers and those who are involved in officer career management (alternative entry subsystems, similar to the Captain's Introduction, would introduce such personnel to the system), (b) content could be expanded to include a subsystem dealing with the planning and decision-making

necessary upon separation from military service, (c) expanded data bases could relate alternate specialty designation and other career events to later career paths, and (d) on-line administration and scoring of assessment instruments could be provided and system monitoring and data collection for research and evaluation could be included.

7. Present Use. OCIPS currently exists in a demonstration version. At present, Signon, Foresight, Overview, and Alternate Specialty have been programmed and are usable in demonstration form. The remaining subsystems--Captain's Introduction, Self-Assessment, and Career Strategies--are in script form but have not yet been programmed. Components that have been tested in the field function well and are accepted by users. ARI feels that OCIPS has demonstrated potential for expanded operations (Cory, 1979). A cost-benefit analysis of the system was carried out (Myers, Cairo, Turner, & Ginzberg, 1980) but further development of the system has been suspended (Cory, 1979).

8. Implications for Use in Military Recruiting. OCIPS has little to offer towards the development of a CVG system for military enlisted recruiting, because it is officer-oriented, slanted towards career progression, and, obviously, because it has yet to be fully developed and tested. Finally, it is dependent on off-line functions for significant portions of the guidance process.

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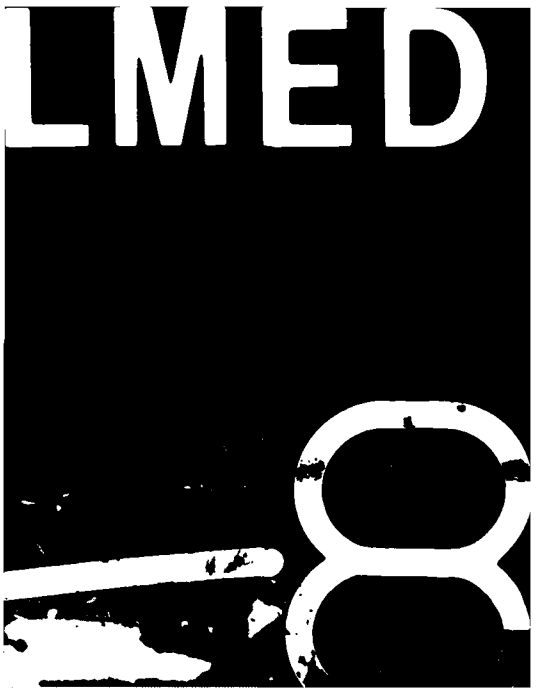
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